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TITLE: INSECT RESISTANT PLANTS

APPLICANT: ADANG, MICHAEL J. ; KEMP, JOHN D.

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ASSIGNOR: ADANG, MICHAEL J. EXC DATE: 10/24/88

ASSIGNEE: LUBRIZOL GENETICS, INC., 29400 LAKELAND BLVD., WICKLIFFE, OH
44092, A CORP. OF NV

BRIEF:

ASSIGNMENT OF ASSIGNORS INTEREST

RETURN ADDRESS: ELLEN P. WINNER
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REEL: 4936 FRAME: 0932 DATE RECORDED: 12/19/88 NUMBER OF PAGES: 002

ASSIGNOR: KEMP, JOHN D. EXC DATE: 11/09/88

ASSIGNEE: LUBRIZOL GENETICS, INC., 29400 LAKELAND BLVD., WICKLIFFE, OH
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BRIEF:

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RETURN ADDRESS: ELLEN P. WINNER
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NO MORE INFORMATION FOR THIS SERIAL NUMBER

ASSIGNEE: LUBRIZOL GENETICS, INC., 29400 LAKELAND BLVD., WICKLIFFE, OH
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TEL: 4986 FRAME: 0932 MAILROOM DT: 12/19/88 NEW APP FIL RCPT DT: 00/00/00
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ASSIGNEE: KEMP, JOHN D.

EXC DATE: 11/09/88

ASSIGNEE: LUBRIZOL GENETICS, INC., 29400 LAKELAND BLVD., WICKLIFFE, OH
44092, A CORP. OF NV

BRIEF:

ASSIGNMENT OF ASSIGNEE'S INTEREST.

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>WARNING< - FIELD CODE NOT VALID 'CLMS'
6215 BACILLUS
361 THURINGIENSIS
319 BACILLUS THURINGIENSIS
(BACILLUS(W) THURINGIENSIS)

L1 0 PLANT#/CLMS
L1 0 BACILLUS THURINGIENSIS AND PLANT#/CLMS
=> s bacillus thuringiensis
6215 BACILLUS

L2 361 THURINGIENSIS
L2 319 BACILLUS THURINGIENSIS
(BACILLUS(W) THURINGIENSIS)

=> s L2 and plant#/clm

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16278 PLANT#/CLM

L3 106 L2 AND PLANT#/CLM

=> s L3 and 435/clas
22532 435/CLAS

L4 31 L3 AND 435/CLAS

=> d 1-31

1. 5,126,133, Jun. 30, 1992, Bacillus thuringiensis isolate active against lepidopteran pests, and genes encoding novel lepidopteran-active toxins; Jewel Payne, et al., 424/93L, 93A; 435/69.1, 71.2, 91, 170, 172.1, 172.3, 252.3, 252.5, 320.1, 832; 536/27; 935/6, 9, 22, 59, 60, 61, 64 [IMAGE AVAILABLE]

2. 5,120,536, Jun. 9, 1992, Bacillus thuringiensis var. donegani preparate or toxin obtained from it, endowed with insecticide activity against Coleoptera; Dante Cidaria, et al., 424/93L; 435/252.1, 252.3, 252.5, 832; 530/350 [IMAGE AVAILABLE]

3. 5,093,120, Mar. 3, 1992, Novel isolates of Bacillus thuringiensis having activity against nematodes; David L. Edwards, et al., 424/93L; 435/172.3, 252.5, 317.1, 832; 514/2; 800/205; 935/63, 64 [IMAGE AVAILABLE]

4. 5,087,558, Feb. 11, 1992, Method for identifying and characterizing organisms; John A. Webster, Jr., 435/5, 4, 6, 34, 810; 436/804; 536/27; 935/78 [IMAGE AVAILABLE]

5. 5,085,588, Feb. 4, 1992, Bacterial promoters inducible by plant extracts; Sharon R. Long, et al., 435/69.1, 71.2, 172.3, 252.2, 12:37:18 COPY AND CLEAR PAGE, PLEASE

05 AUG 92 12:37:49 U.S. Patent & Trademark Office P0004
22532, 320.1, 872; 536/27; 800/205; 935/35, 36, 41, 43, 67, 72
[IMAGE AVAILABLE]

6. 5,103,055, Nov. 5, 1991, Preparation of strains of Bacillus thuringiensis having an improved activity against certain lepidopterous pests and novel strain produced thereby; Denis H. Burges, et al., 424/93R; 435/69.1, 71.1, 172.1, 172.3, 252.5, 320.1, 832; 536/27; 935/55, 59, 64, 66, 74 [IMAGE AVAILABLE]

7. 5,051,489, Oct. 29, 1991, Insecticidal Bacillus thuringiensis

straine with activity against lepidoptera; Roger L. Bernier, et al.,
474 PQL: 435/72.3, 252.5, 832 [IMAGE AVAILABLE]

8. 5,045,460, Sep. 3, 1991, DNA sequence encoding
metallocarboxypeptidase inhibitor protein; Belinda M. Martineau, et al.,
435/172.3, 317.1; 536/27; 935/30, 67 [IMAGE AVAILABLE]

9. 5,037,523, Aug. 13, 1991, Novel *Bacillus thuringiensis* isolate
denoted B.t. PS81F, active against lepidopteran pests, and a gene
encoding a lepidopteran-active toxin; Jewel Payne, et al., 424/93L;
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252.3, 320.1, 832, 848, 874; 536/27; 935/6, 9, 22, 59, 66, 72,
73 [IMAGE AVAILABLE]

10. 5,017,373, May 21, 1991, Cloning and expression of *bacillus*
thuringiensis gene toxic to beetles of the order coleoptera; Corinna
Herrnstadt, et al., 424/93A; 435/69.1, 71.2, 91, 170, 172.1,
172.3, 252.34, 320.1, 876; 536/27; 935/6, 9, 22, 29, 59, 60, 64,
66, 72 [IMAGE AVAILABLE]

11. 5,015,580, May 14, 1991, Particle-mediated transformation of soybean
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plants and lines; Paul Christou, et al., 435/172.3, 172.1, 240.45,
240.47, 240.48, 240.5, 317.1, 320.1; 800/205, DIG.26; 935/30,
52, 53, 67, 85 [IMAGE AVAILABLE]

12. 5,008,194, Apr. 16, 1991, nifH promoters of *Bradyrhizobium*; Barry G.
Rofte, et al., 435/172.3, 252.2, 252.3, 320.1; 536/27; 935/6, 35,
41 [IMAGE AVAILABLE]

13. 5,006,336, Apr. 9, 1991, Novel coleopteran-active *bacillus*
thuringiensis isolate; Jewel Payne, 424/93L; 435/252.5, 822;
530/350 [IMAGE AVAILABLE]

14. 5,004,863, Apr. 2, 1991, Genetic engineering of cotton plants and
lines; Paul F. Umhoeck, 800/205; 435/172.3; 800/200, 255, DIG.27,
DIG.63; 935/67 [IMAGE AVAILABLE]

15. 5,002,765, Mar. 26, 1991, Cloning and expression of *bacillus*
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Herrnstadt, et al., 424/93A; 435/69.1, 71.2, 91, 170, 172.1,
172.3, 252.3, 252.33, 252.34; 536/27; 935/6, 9, 22, 29, 59, 60,
61, 66, 72, 73 [IMAGE AVAILABLE]

16. 5,001,061, Mar. 19, 1991, nifD promoter of *Bradyrhizobium*; Barry G.
Rofte, et al., 435/172.3, 252.2, 252.3, 320.1; 536/27; 935/6, 35,
41 [IMAGE AVAILABLE]

17. 4,999,192, Mar. 12, 1991, Novel coleopteran-active *bacillus*
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435/252.5, 832; 530/350 [IMAGE AVAILABLE]

18. 4,990,332, Feb. 5, 1991, Novel lepidopteran-active *Bacillus*
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thuringiensis isolate; Jewel Payne, et al., 424/93L, 84; 435/252.5
[IMAGE AVAILABLE]

19. 4,966,765, Oct. 30, 1990, Novel coleopteran-active *Bacillus thuringiensis* isolate; Jewel Payne, et al., 424/93L; 435/252.1, 252.5, 832; 530/350, 825 [IMAGE AVAILABLE]

20. 4,910,016, Mar. 20, 1990, Novel *Bacillus thuringiensis* isolate; Frank H. Gaertner, et al., 424/93L, 195.1, DIG.8; 435/252.5, 832

21. 4,902,507, Feb. 20, 1990, Toxic strains of the bacterium *Bacillus thuringiensis* for control of the bertha armyworm *Mamestra configurata*; Oswald N. Morris, et al., 424/93L, 88, 92; 435/252.31

22. 4,889,918, Dec. 26, 1989, Protein toxin from *bacillus thuringiensis* which is toxic to coleoptera; Aloisius Krieg, et al., 530/350; 424/405; 435/69.1, 71.3, 832; 514/2

23. 4,853,332, Aug. 1, 1989, Structural genes, plasmids and transformed cells for producing cysteine depleted muteins of biologically active proteins; David F. Mark, et al., 435/252.33, 69.52, 172.3, 252.1, 320.1; 536/27; 930/141, 142

24. 4,803,165, Feb. 7, 1989, Nif promoter of fast-growing *rhizobium japonicum*; Edward R. Appelbaum, 435/172.3, 69.1, 252.2, 252.33, 320.1; 536/27; 935/29, 30, 41, 56, 64, 67, 72

25. 4,797,276, Jan. 10, 1989, Cotton boll weevil, alfalfa weevil, and corn rootworm via contact with a strain of *bacillus thuringiensis*; Corinna Herrnstadt, et al., 424/84, 93L; 435/71.3, 832

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05 AUG 92 12:40:05 U.S. Patent & Trademark Office P0007

26. 4,771,002, Sep. 13, 1988, Transcription in plants and bacteria; Stanton B. Gelvin, 435/172.3, 252.2, 252.33, 320.1; 935/30, 35, 56, 72

27. 4,766,203, Aug. 23, 1988, New strain of *Bacillus*, a toxin derived thereof and a composition for combating Coleoptera; Aloisius Krieg, et al., 530/370; 424/93L; 435/832; 514/2; 530/825

28. 4,754,372, Aug. 16, 1988, Compositions containing *bacillus thuringiensis* toxin toxic to beetles of the order coleoptera, and uses thereof; Corinna Herrnstadt, et al., 424/93L, 84; 435/832; 514/2

29. 4,737,462, Apr. 12, 1988, Structural genes, plasmids and transformed cells for producing cysteine depleted muteins of interferon-.beta.; David F. Mark, et al., 435/252.33, 240.1, 240.2, 240.4, 243, 252.31, 252.34, 320.1; 536/27; 930/142, DIG.530

30. 4,717,653, Jan. 5, 1988, Method for identifying and characterizing organisms; John A. Webster, Jr., 435/5, 6, 35, 39, 172.3, 803; 436/501; 935/78 [IMAGE AVAILABLE]

31. 4,695,425, Sec. 22, 1987, Cellular encapsulation of pesticides produced by expression of heterologous genes; Andrew C. Barnes, et al.,

424/930; 47/58; 435/69.1, 172.3, 252.3, 252.31, 252.33,
252.34, 254, 255, 256, 260, 317.1
=> c 14 ac

US PAT NO: 5,004,863 [IMAGE AVAILABLE] L4: 14 of 31
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US PAT NO: 5,004,863 [IMAGE AVAILABLE] L4: 14 of 31

ABSTRACT:

A method is disclosed to achieve genetic transformation of cotton plants and lines. Immature cotton tissues are genetically transformed in vitro, by Agrobacterium-mediated genetic transformation. The resultant cotton tissues are subjected to a selection agent or agents to screen for transformants. The transformed cultures are then induced to commence somatic embryogenesis. One possible regime for regenerating such somatic embryos into whole cotton plants is disclosed.

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(FILE 'USPAT' ENTERED AT 12:33:42 ON 05 AUG 92)
L1 0 S BACILLUS THURINGIENSIS AND PLANT#/CLMS
L2 319 S BACILLUS THURINGIENSIS
L3 106 S L2 AND PLANT#/CLM
L4 31 S L3 AND 435/CLAS
=> s 12 and (transform? or transgenic)(w)plant#
126336 TRANSFORM?
57 TRANSGENIC
100903 PLANT#
76 (TRANSFORM? OR TRANSGENIC) (W)PLANT#
L5 4 L2 AND (TRANSFORM? OR TRANSGENIC) (W)PLANT#
=> d 1-4

1. 5,045,460, Sep. 3, 1991, DNA sequence encoding metallocarboxypeptidase inhibitor protein; Belinda M. Martineau, et al.,
12:42:58 COPY AND CLEAR PAGE, PLEASE
05 AUG 92 12:43:01 U.S. Patent & Trademark Office P0009
435/172.3, 317.1; 536/27; 935/30, 67 [IMAGE AVAILABLE]

2. 5,015,580, May 14, 1991, Particle-mediated transformation of soybean plants and lines; Paul Christou, et al., 435/172.3, 172.1, 240.45, 240.47, 240.48, 240.5, 317.1, 320.1; 800/205, DIG.26; 935/30, 52, 53, 67, 85 [IMAGE AVAILABLE]

3. 5,004,863, Apr. 2, 1991, Genetic engineering of cotton plants and lines; Paul F. Umbeck, 800/205; 435/172.3; 800/200, 255, DIG.27, DIG.63; 935/67 [IMAGE AVAILABLE]

4. 4,771,002, Sep. 13, 1988, Transcription in plants and bacteria; Stanton B. Gelvin, 435/172.3, 252.2, 252.33, 320.1; 935/30, 35, 56, 72
=> set high off
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=> s (transgenic or transform?) (w)plant#
57 TRANSGENIC
126326 TRANSFORM?
100903 PLANT#
L6 76 (TRANSGENIC OR TRANSFORM?) (W)PLANT#

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L7 4 L2 AND L6
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US PAT NO: 5,045,460 [IMAGE AVAILABLE] L7: 1 of 4

DETDESC:

DETD(5)

MCPI . . . amino peptidase inhibitors, and carboxypeptidase inhibitors having different specificity than the MCPI proteinase. Toxins, such as the crystal protein of *Bacillus thuringiensis* (Bt) have been expressed in plants and have shown insecticidal activity (See, European Patent Application 0193259).

=> d 2-4 kwic

US PAT NO: 5,015,580 [IMAGE AVAILABLE] L7: 2 of 4

DETDESC:

DETD(42)

The . . . the alfalfa mosaic virus (AMV) coat protein mRNA 5' untranslated region, a DNA fragment encoding an amino-terminal portion of the *Bacillus thuringiensis* delta-endotoxin, and a fragment encoding the polyadenylation region of the nopaline synthase gene from *Agrobacterium tumefaciens* strain A208.

US PAT NO: 5,004,863 [IMAGE AVAILABLE] L7: 3 of 4

DETDESC:

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US PAT NO: 5,004,863 [IMAGE AVAILABLE] L7: 3 of 4

DETD(4)

The . . . be any foreign gene selected to achieve a useful result if expressed in cotton plants. For example, expression of the *Bacillus thuringiensis* crystal protein toxin in the cells of cotton plants would make those cells toxic if ingested by Lepidoptera insects, thus. . .

US PAT NO: 4,771,002 L7: 4 of 4

SUMMARY:

BSUM(55)

The . . . anaerobic conditions (e.g. water-logging), drought, or osmotic stress; improved resistance or tolerance to insect (e.g.

insecticidal toxins such as the *Bacillus thuringiensis* crystal protein; arachnid, nematode; or epiphyte pests and fungal, bacterial, or viral diseases; the production of enzymes or secondary metabolites.

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